

## B. Remarks

The claims are 1-6, with claims 1, 3 and 6 being independent.

Reconsideration of the present claims is expressly requested.

Initially, Applicants and their undersigned representative would like to thank the Examiner for the courtesies extended by the Examiner during a telephonic interview conducted on September 3, 2008. During the interview, Applicants' representative argued that it would not have been obvious to combine the teaches of U.S. Patent No. 6,218,035 B1 (Fuglevand) and U.S. Patent Application Publication No. 2003/0129467 A1 (Morishima) as alleged in the Office Action, and even if the teachings were combined, the resulting combination would not produce the present invention. A more detailed discussion of the arguments, as well as other issues, is provided below.

Claims 1-3, 5 and 6 stand rejected under 35 U.S.C. § 103(a) as being allegedly obvious from Fuglevand in view of Morishima. Claim 4 stands rejected under 35 U.S.C. § 103(a) as being allegedly obvious from Fuglevand in view of Morishima and U.S. Patent No. 6,523,699 B2 (Akita). The grounds of rejection are respectfully traversed.

Prior to addressing the merits of rejection, Applicants would like to briefly discuss some of the features of the presently claimed invention. That invention, in pertinent part, is related to a membrane electrode assembly for a proton-exchange membrane fuel cell, a method for its production, and a proton-exchange membrane fuel cell that includes this assembly. The presently claimed assembly comprises a polymer electrolyte membrane and an electrode catalyst layer. The polymer electrolyte membrane is formed by polymerizing a composition containing at least a compound having proton

conductivity and a compound having activity to an active energy ray, or a composition containing at least a compound having proton conductivity and activity to the active energy ray. Importantly, at least a part of the polymer electrolyte membrane infiltrates into the electrode catalyst layer. The infiltration is due to the coating of the electrode catalyst layer with a liquid solution of the aforementioned compounds, thereby increasing the contact between the electrolyte membrane and the catalyst, prior to polymerization.

Fuglevand is related to a proton exchange membrane fuel cell power system that forms an electrolyte membrane by photo-curing or thermally polymerizing the electrolyte membrane material by itself or on a supporting matrix (Examples 1-3, cols. 19-22). The polymerized membrane is then sandwiched between the electrodes. The Examiner acknowledged that Fuglevand does not teach coating the electrolyte membrane precursor material before polymerization such that the claimed infiltration takes place.

The Examiner, however, pointed to the disclosure in Morishima at paragraph [0049] that teaches that the catalyst layer can be coated with a solution of the same electrolyte as that of the electrolyte membrane prior to hot pressing the catalyst layer and the electrolyte membrane. The Examiner alleged that if this method is used in Fuglevand, i.e., a solution of the same electrolyte as that of the electrolyte membrane in Fuglevand is coated on the catalyst layer prior to hot pressing, the resulting assembly would have the presently claimed infiltration. Thus, the Examiner's position is that coating a solution of the electrolyte material on the catalyst layer prior to hot pressing the electrolyte membrane and the catalyst layer inherently results in the claimed structure with

the infiltration of the electrolyte membrane into the catalyst layer. Applicants respectfully disagree for the following reasons.

In both in Fuglevand and in Morishima, it is essential to separately prepare a solid electrolyte membrane. While Morishima discloses that an electrolyte solution may be applied to the catalyst layer before hot pressing the resulting layer with the electrolyte membrane, this process always produces an interface between the electrolyte membrane and the electrolyte components on or in the catalyst layer (if assumed, *arguendo*, that infiltration takes place), which increases the resistance of the cell. To the contrary, in the present invention, the compound having proton conductivity that is applied on the catalyst layer is converted into an electrolyte membrane by polymerization. As a result, there is no interface between the electrolyte membrane and the parts thereof in and on the catalyst layer. Thus, the membrane electrode assembly formed as recited in claims 1 and 6 differs structurally from the alleged combination of Fuglevand and Morishima.

Also, the Examiner has not shown that the combination of Fuglevand and Morishima would result in a method in which polymerization of the electrolyte membrane precursor composition occurs after infiltration into the catalyst layer, as recited in claim 3. The disclosure in Morishima regarding the use of a solution refers to the solution of the same electrolyte material as that of the electrolyte membrane, i.e., the catalyst layer is coated with an already polymerized electrolyte membrane material.

In addition, as discussed at length in the aforementioned interview, it would not be obvious to replace a substrate (supporting matrix) disclosed in Fuglevand, onto which the membrane material is applied before polymerization, with a catalyst material of

Morishima. Specifically, Fuglevand defines the substrate onto which the membrane material may be coated as a porous supporting matrix that “does not reactively produce hydrogen ions and is dielectric. Further, the porous supporting matrix is substantially inert and has a porosity of about 30% to about 80% and has a given proton conductivity which is proportional to the porosity of the supporting matrix. An acceptable porous supporting matrix may be selected from the group consisting essentially of grafted hydrophilic polyethylenes” (col. 19, lines 5-13).

Morishima teaches forming the catalytic layer by “mixing carbon carrying platinum catalyst powder with a polytetrafluoroethylene liquid suspension, coating the mixture on carbon paper, followed by heat treatment” (paragraph [0049]). This catalyst layer does not meet the definition of a supporting matrix set forth in Fuglevand. For instance, while the supporting matrix in Fuglevand is dielectric, substantially inert, and hydrophilic, the catalyst layer in Morishima is electrically conductive, catalytic, and hydrophobic.

Thus, Applicants respectfully submit that Fuglevand teaches away from using a catalytic layer of Morishima as a substrate (supporting matrix) for depositing and forming an electrolytic layer. *In re Grasselli*, 218 U.S.P.Q. 769, 779 (Fed. Cir. 1983) (The claimed catalyst that contained both iron and an alkali metal was not suggested by the combination of a reference that taught the interchangeability of antimony and alkali metal with the same beneficial result, combined with a reference expressly excluding antimony from, and adding iron to, a catalyst.). Accordingly, since “[i]t is improper to combine references where the references teach away from their combination,” it would not have

been obvious to substitute the supporting matrix in Fuglevand with the catalytic layer of Morishima. M.P.E.P. § 2145 (X)(D)(2).

Akita cannot cure the deficiencies of Fuglevand and Morishima. Akita was cited for the teaching related to the platinum catalyst thickness. Even if assumed, *arguendo*, that Akita contains the alleged teaching, this reference, like Fuglevand and Morishima, does not disclose or suggest the presently claimed infiltration.

Accordingly, Applicants respectfully submit that the cited documents, whether considered separately or in any combination, do not disclose or suggest all of the presently claimed elements.

Wherefore, withdrawal of the outstanding rejections and passage of the application to issue are respectfully requested.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

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